

TEACHER SCAFFOLDING PRACTICES IN PLAYING L-STEAM IN EARLY CHILDHOOD

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Abstract

L-STEAM play in early childhood education positions teachers as facilitators who play a crucial role in providing learning support through responsive interactions. However, studies on teacher scaffolding practices in the context of L-STEAM play are still relatively limited, particularly in learning situations that take place in early childhood education (PAUD) units. This study aims to explore teacher scaffolding practices in L-STEAM play in early childhood. The study used a qualitative approach with a case study design at ADC+ Kindergarten. The study participants consisted of five kindergarten group teachers and one principal, while eight children aged 5–6 years were involved as observation subjects. Data were collected through observation, in-depth interviews, and documentation, then analyzed using the interactive model of Miles, Huberman, and Saldaña. The results showed that teacher scaffolding practices were realized through questioning, prompting, modeling, feedback, and reinforcement provided gradually according to the children's needs during L-STEAM play. These forms of scaffolding encouraged children to be more active in exploring, expressing ideas, trying various alternatives, and communicating their learning experiences. The research findings confirm that scaffolding practices are an important part of teachers' pedagogical practices that support the creation of meaningful and child-centered L-STEAM play experiences.

Keywords: *Early Childhood, L-STEAM Play, Pedagogical Practice, Teacher Scaffolding*

INTRODUCTION

Early childhood education emphasizes the importance of child-centered, contextual learning experiences that encourage active involvement in building knowledge. Play is the primary approach for children to learn through exploration, interaction, and hands-on experience, tailored to their developmental characteristics. In this context, teachers are no longer positioned as conveyors of information, but as facilitators who create a learning environment that supports children to think, ask questions, experiment, and discover knowledge independently. Therefore, the quality of children's learning experiences is greatly influenced by the quality of teachers' pedagogical practices during play activities. One emerging approach in early childhood education is L-STEAM (Literacy, Science, Technology, Engineering, Arts, and Mathematics) play. This approach integrates literacy, science, technology, engineering, arts, and mathematics through authentic play experiences, giving children the opportunity to observe, experiment, solve problems, discuss, and communicate ideas based on their experiences. L-STEAM play not only aims to develop academic skills but also builds children's critical thinking, creativity, collaboration, communication, and curiosity through meaningful learning experiences. The success of implementing this approach is greatly influenced by how teachers facilitate the learning process through interactions that are responsive to children's needs and initiatives.

From Vygotsky's sociocultural perspective, the learning process occurs through social interactions between children and those with greater knowledge or experience. Through the concept of the Zone of Proximal Development (ZPD), teachers provide temporary support (scaffolding) to enable children to achieve abilities that cannot yet be achieved independently. This support is provided gradually according to the child's needs and is reduced when the child is able to complete tasks independently. Thus, scaffolding not only helps children complete learning activities but also becomes part of the teacher's pedagogical practice that encourages children to build understanding, develop ideas, and expand learning experiences during play. In the context of L-STEAM play, scaffolding practices are important because teachers are required to be able to respond flexibly to children's questions, ideas, and initiatives. Teachers need to determine when to provide assistance, when to ask challenging questions, when to provide examples, and when to provide opportunities for children to explore various possibilities independently. These

practices create pedagogical interactions that enable children to actively engage in the process of thinking, exploring, and constructing meaning from their play experiences. Therefore, scaffolding is a form of pedagogical practice that plays a crucial role in supporting the quality of L-STEAM play experiences in early childhood education. Various studies have shown that the STEAM approach can enhance children's creativity, critical thinking, problem-solving, and engagement through active learning experiences (Ng et al., 2022; Nguyen et al., 2025). Other research explains that the quality of teachers' pedagogical interactions contributes to children's participation during the learning process (Kangas et al., 2021), while the integration of literacy in STEAM helps children construct meaning through more contextualized learning experiences (Johnston et al., 2022). However, most research still focuses on STEAM implementation, the effectiveness of learning models, or children's learning outcomes. Studies specifically exploring how teachers provide scaffolding during L-STEAM play in natural learning situations in early childhood education are still relatively limited.

This gap indicates the need for research examining teachers' scaffolding practices as part of pedagogical practices in L-STEAM play. Understanding these practices is important because the quality of support provided by teachers can influence children's opportunities to explore, express ideas, construct knowledge, and develop thinking skills during play activities. This study is expected to provide a more in-depth picture of how teachers build responsive pedagogical interactions to support early childhood learning experiences. Based on this description, this study aims to explore teachers' scaffolding practices in L-STEAM play for early childhood at ADC+ Kindergarten. The novelty of this study lies in the focus of the study on scaffolding practices as part of teachers' pedagogical practices manifested through learning interactions during L-STEAM play in the context of early childhood education. The research findings are expected to enrich studies on teachers' pedagogical practices and serve as a basis for developing more responsive learning support strategies in the implementation of L-STEAM play.

METHOD

This study used a qualitative approach with a case study design to explore teachers' scaffolding practices in L-STEAM play for early childhood. The qualitative approach was chosen because it allows researchers to understand the phenomenon in depth in its natural context, while the case study design is used to comprehensively examine pedagogical practices that occur in a specific context (Creswell, 2018; Yin, 2018). The study was conducted at ADC+ Kindergarten from January to July 2026, an early childhood education institution that implements L-STEAM play as one of its learning approaches.

The research participants consisted of five kindergarten teachers as primary informants and one principal as a supporting informant. Additionally, eight children aged 5–6 years old were observed to obtain an overview of the scaffolding practices implemented by teachers during L-STEAM play activities. Participants were selected using a purposive sampling technique based on their involvement in the implementation of L-STEAM play.

The researcher acted as the primary instrument, being present directly at the research location. Data were collected through passive participant observation, semi-structured interviews, and documentation. Observations focused on teachers' scaffolding practices during L-STEAM play activities, while interviews with teachers and the principal were conducted to gain an understanding of the forms of pedagogical support provided to children. Documentation included teaching modules, learning notes, activity photographs, and recordings of learning activities as supporting data.

The research instruments consisted of observation guidelines, interview guidelines, and documentation sheets developed based on the research focus. The observation guidelines were developed based on scaffolding practice indicators, which include questioning, prompting, modeling, feedback, and reinforcement, provided in stages according to the children's learning needs. The research instruments were validated through expert judgment to ensure the indicators aligned with the research focus.

Data analysis used the interactive model of Miles, Huberman, and Saldaña (2014), which includes data condensation, data presentation, and drawing and verifying conclusions. Analysis was conducted continuously from the data collection process through coding, categorization, and identification of themes that describe teachers' scaffolding practices in L-STEAM play. Data validity was maintained through source triangulation, technical triangulation, and member checking to increase the credibility of the research findings.

RESULTS AND DISCUSSION

This study aims to describe the scaffolding practices implemented by teachers in L-STEAM play activities for early childhood. Based on observations, interviews, and documentation, it was found that teachers implemented scaffolding in stages according to the children's learning needs during the play process. Teachers did not directly

provide answers or examples of solutions, but rather provided temporary assistance through lead questions, simple demonstrations, hints, and verbal encouragement so that children could find solutions independently.

In the initial stage of the activity, the teacher prepares various loose parts media consisting of natural and recycled materials such as stones, twigs, leaves, bottle caps, straws, popsicle sticks, used cardboard, and wooden blocks. All of these materials are arranged in such a way that they are easily accessible to the children. The teacher then provides an apperception regarding the learning theme and introduces the various available materials without providing examples of the final product. This strategy provides an opportunity for children to develop ideas, imagination, and creativity based on their experiences.

During play activities, the teacher observes each child's activity to identify their individual ability levels and needs for assistance. Children who have difficulty determining the building design receive assistance in the form of open-ended questions, such as "How do you think this building will be taller?", "What should be done to keep your bridge from collapsing?", or "What object could be used to make it stronger?". These questions encourage children to think critically and try various alternative solutions without eliminating the opportunity for independent exploration.

Observations show that the most common forms of scaffolding teachers provide include verbal instructions, nonverbal cues, brief demonstrations, positive reinforcement, and feedback on children's explorations. Teachers also allow sufficient time for children to try again if they fail. When children successfully find a solution, teachers gradually reduce the intensity of assistance so they can complete the activity independently.

In the Science aspect, children are seen observing the characteristics of various loose materials, such as size, weight, texture, and strength. They begin to compare objects that can support buildings with those that can easily shift. The teacher only guides through questions, so the discovery process remains entirely within the children.

In the Technology aspect, children use various simple tools such as scissors, glue, raffia string, and clamps to connect several materials. The teacher demonstrates the safe use of the tools, then allows the children to use them according to their individual needs. In the Engineering aspect, children demonstrate their ability to design and build various shapes such as houses, bridges, towers, vehicles, and playgrounds. When a construction collapses, the teacher does not immediately repair the children's work, but instead encourages them to analyze the cause of the failure and try new strategies.

In the Arts aspect, children express their creativity through combinations of colors, shapes, patterns, and the arrangement of various loose materials. Teachers appreciate each child's work without comparing one child with another, allowing children's self-confidence to develop optimally. In the Mathematics aspect, children begin to apply the concept of counting objects, recognizing geometric shapes, grouping by size and color, and comparing the length and height of the structures they create. Teachers utilize play situations to introduce mathematical concepts contextually without providing formal learning.

In general, the scaffolding practices implemented by teachers had a positive impact on children's engagement during the learning process. Children appeared more active in discussions, expressed their opinions, collaborated with their peers, and demonstrated improved problem-solving skills compared to the beginning of the activity.

DISCUSSION

The results of the study indicate that teachers' scaffolding practices in L-STEAM-based learning play a significant role in supporting the development of early childhood thinking skills. The assistance provided by teachers is adaptive, tailored to each child's actual abilities, enabling them to achieve higher levels of competence. This finding aligns with Lev Vygotsky's theory, which explains that learning occurs optimally when children receive assistance from adults or peers who are more competent within the Zone of Proximal Development (ZPD). This assistance is temporary and is gradually reduced when children are able to complete tasks independently. The scaffolding practices found in this study show that teachers use more open-ended questions than providing direct answers. This strategy provides opportunities for children to construct knowledge through thought processes, exploration, and real-life experiences. This approach aligns with the constructivist view, which positions children as active subjects in constructing their own knowledge through interaction with the environment.

In L-STEAM activities, the use of loose parts provides ample space for children to explore various possibilities without being limited by a single function. The open-ended nature of the material allows children to create various shapes according to their ideas and imagination. In such situations, the presence of scaffolding becomes crucial because the teacher acts as a facilitator, maintaining a balance between freedom of exploration and achieving learning objectives. Research findings also show that scaffolding can improve children's critical thinking skills. When a structure collapses, the teacher does not immediately repair it or provide a solution, but instead invites children to reflect on the cause of the problem. This process trains analytical skills, logical reasoning, and decision-making. Learning experiences like this provide children with the opportunity to understand cause-and-effect relationships through direct experience.

In addition to improving critical thinking skills, scaffolding also contributes to the development of children's creativity. Teachers give children the freedom to choose materials, determine the form of the work, and develop strategies for completion. This freedom results in a variety of different works even though they use the same materials. This demonstrates that a learning environment that provides support without limiting creativity can encourage the emergence of new ideas from children. Collaboration also develops during play activities. Children exchange ideas, discuss building designs, share materials, and work together to complete projects. Teachers reinforce these positive interactions, so that children's social communication skills naturally improve. This condition demonstrates that L-STEAM learning not only develops cognitive abilities but also children's social-emotional aspects.

Based on the overall research findings, teachers' scaffolding practices in L-STEAM play have proven to be an effective learning strategy for developing various aspects of early childhood development in an integrated manner. Teachers act as facilitators who provide assistance as needed, encourage exploration, facilitate the thinking process, and gradually reduce assistance when children have achieved learning independence. Thus, the implementation of scaffolding in L-STEAM learning can create meaningful, enjoyable, and child-centered learning experiences that support the development of 21st-century skills, such as critical thinking, creativity, collaboration, communication, and problem-solving abilities.

CONCLUSION

Based on the research results, it can be concluded that the scaffolding practices implemented by teachers in L-STEAM play activities are an effective learning strategy for optimizing early childhood development. Scaffolding is not only manifested in the form of providing temporary assistance, but also through reflective questions, guidance, demonstrations, positive reinforcement, and feedback tailored to each child's ability level. This assistance is provided gradually and reduced as the child's abilities increase, enabling them to build knowledge, make decisions, and solve problems independently.

The application of scaffolding in L-STEAM learning provides a meaningful learning experience because children have the opportunity to explore various loose materials, develop creative ideas, conduct experiments, and find solutions through scientific thinking processes. This condition encourages the development of critical thinking skills, creativity, communication, collaboration, problem-solving abilities, and learning independence, which are important competencies in facing the challenges of 21st-century learning. Furthermore, the integration of elements of Science, Technology, Engineering, Arts, and Mathematics in play activities makes the learning process more contextual, enjoyable, and child-centered.

The findings of this study confirm that the successful implementation of L-STEAM learning is significantly influenced by the quality of scaffolding practices employed by teachers. Teachers no longer serve as primary sources of information, but rather as facilitators capable of creating a safe, challenging learning environment and providing

space for children to optimally explore their potential. Thus, scaffolding practices are a crucial indicator in improving the quality of early childhood learning because they can gradually bridge children's actual abilities to their potential.

This research implies that early childhood education institutions need to strengthen teacher competency in designing and implementing scaffolding strategies integrated with the L-STEAM approach. This competency improvement can be achieved through training, mentoring, and the development of professional learning communities, enabling teachers to provide appropriate support tailored to children's developmental needs. With the planned and sustainable implementation of scaffolding, L-STEAM learning is expected to produce students who are creative, innovative, and adaptive, and prepared to face future changes and challenges.

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